

ENGINEERING DEPARTMENT  
TECHNICAL REPORT

TR-RE-CCSD-FO-110 8-3

April 24, 1967

**SATURN IB PROGRAM**

TEST REPORT  
FOR

CALIBRATION VALVE, 1/4-INCH, 6000-PSIG

Sage Engineering and Valve Co. Drawing Number **2-9064-C**

With Probe Drawing Number 2-9074B

NASA Drawing Number 75M09618 PCVA-1

N67-35987  
(ACCESSION NUMBER)  
10 65-254  
(PAGES)  
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(NASA CR OR TMX OR AD NUMBER)  
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SPACE DIVISION



**CHRYSLER**  
CORPORATION

TEST REPORT

FOR

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Sage Engineering and Valve Co. Drawing Number 2-9064-C

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NASA Drawing Number 75M09618 PCVA-1

ABSTRACT

This report presents the results of tests performed on one specimen of the Calibration Valve 75M09618 PCVA-1 and Probe 75M07278. The following tests were performed :

- |                         |             |
|-------------------------|-------------|
| 1. Receiving Inspection | 6. Surge    |
| 2. Proof Pressure       | 7. Salt Fog |
| 3. Functional           | 8. Cycle    |
| 4. Low Temperature      | 9. Burst    |
| 5. High Temperature     |             |

The specimen performance was in accordance with the specification requirements of NASA drawing 75M09618 PCVA-1 throughout the test program and met the requirements of the John F. Kennedy Space Center except for interchangeability,

The probe does not contain provisions to prevent interchange from one valve to another.

Initial testing began with specimen valve PN 2-9135 but was replaced with PN 2-9064C after PN 2-9135 proved unsatisfactory.

TEST REPORT

FOR

2 CALIBRATION VALVE 1/4-INCH, 6000-PSIG,

Sage Engineering and Valve Co. Drawing Number 2-9064-C

With Probe Drawing Number 2-9074B

NASA Drawing Number 75M09618 PCVA-1

April 24, 1967 /

107 3 10  
CHRYSLER CORPORATION SPACE DIVISION - NEW ORLEANS, LOUISIANA

## FOREWORD

The tests reported herein were conducted for the John F. Kennedy Space Center by Chrysler Corporation Space Division (CCSD), New Orleans, Louisiana. This document was prepared by CCSD under contract NAS 8-4016, Part VII, CWO 271620.



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Calibration Valve, 75M09618 PCVA-1,  $\frac{1}{4}$ -Inch, 6000-psig

# CHECK SHEET

FOR

CALIBRATION VALVE, 1/4-INCH, 6000-PSIG

MANUFACTURER Sage Engineering and Valve Co.

MANUFACTURER'S DRAWING NUMBER, VALVE: 2-9064-C

MANUFACTURER'S DRAWING NUMBER, PROBE: 2-9074B

NASA DRAWING NUMBER: 75MO9618 PCVA-1

TESTING AGENCY: Chrysler Corporation Space Division, New Orleans, Louisiana

AUTHORIZING AGENCY: NASA KSC

## I. FUNCTIONAL REQUIREMENTS

- A. OPERATING MEDIUM: Helium
- B. PROOF PRESSURE: 9000 psig
- C. LEAKAGE: None

## II. CONSTRUCTION

- A. MATERIAL: Body, sleeve, and protective cover of the valve and probe are stainless steel. Valve seats are Teflon. The valve spring is 316 stainless steel.
- B. CONNECTIONS: MC 240-4

## III. ENVIRONMENTAL REQUIREMENTS

- A. TEMPERATURE: 5 to 140°F
- B. ATMOSPHERE: Salt fog

## IV. LOCATION AND USE:

The calibration valve is used in the pneumatics system to facilitate calibration of pressure sensing instruments without the necessity of removing them from the system.

# TEST SUMMARY

## CALIBRATION VALVE 75M09618 PCVA-1

| Environment          | Operational Boundary   | Test Objective   | Test Results   | Remarks  |
|----------------------|--|--|----------------|--|
| Receiving Inspection | Comply with NASA drawing number 75M09618 PCVA-1 and vendor drawing numbers 2-9075 and 2-9074B. | Determine compliance with NASA and vendor drawings and examined for defects or poor workmanship.                     | Unsatisfactory | Probe can be inter-changed with other valves or systems. |
| Proof Pressure       | 9000 psig for 15 minutes. Last 5 minutes with probe inserted.                                  | Check for leakage and distortion.  | Satisfactory   | No leakage or distortion                                 |
| Functional           | 6000 psig inlet<br>6000 psig probe   | Check for internal and external leakage. Check equal pressure between inlet and outlet and between probe and outlet. | Satisfactory   |  |
| LOW Temperature      | +5°F   | Determine if specimen performance is impaired by low temperature.  | Satisfactory   |  |
| High Temperature     | +140°F for 72 hours.   | Determine if specimen performance is impaired by high temperature.   | Satisfactory   |  |
| Surge                | 0 to 6000-psig in 100 ms   | Determine if specimen performance is impaired by surges.   | Satisfactory   |  |
| Salt Fog             | Salt fog exposure for 240 hours  | Determine if specimen performance is impaired by salt fog.   | Satisfactory   |  |
| Cycles               | 1000 cycles  | Determine if specimen performance is impaired by cycling.  | Satisfactory   | Body seal was replaced after 250 cycles.                 |
| Burst                | Valve inlet 24,000-psig for 15 minutes. Probe inlet 24,000-psig for 15 minutes.                | Maintain 24,000 psig for 15 minutes on valve inlet and probe inlet.  | Satisfactory   | No leakage, damage, or distortion                        |

## SECTION I

### INTRODUCTION

#### 1.1 SCOPE

This report presents the results of the tests that were performed to determine if the Calibration Valve 75MO9618 PCVA-1 meets the operational and environmental requirements of the John F. Kennedy Space Center. A summary of the test results is presented on page viii.

#### 1.2 ITEM DESCRIPTION

1.2.1 The valve and probe are manufactured by the Sage Engineering and Valve Company and are used at Launch Complex 34 as an instrument calibration aide.

1.2.2 One specimen of the Calibration Valve 75MO9618 PCVA-1 was tested. The valve measures, 1-7/8 inches in length, 1 inch in width and 2-5/16 inches in height without probe and is equipped with a probe that measures 2 inches in length.

1.2.3 Insertion of the probe closes the inlet of the calibration valve and allows a calibration pressure to be introduced through the probe to the outlet of the calibration valve. The probe and valve assembly are designed for use with helium, gaseous hydrogen and gaseous nitrogen at temperatures ranging from 5 to 140°F at a working pressure of 6000-psig. The probe can only be inserted into the valve body for which it was designed and can only be inserted in one way.

#### 1.3 PI CABI DOCUMENTS

1.3.1 The following documents contain the test requirements for Calibration Valve 75MO9618 PCVA-1:

- a. KSC-STD-164(D), Standard Environmental Test Methods for Ground Support Installations at Cape Kennedy
- b. NASA Drawing 75MO9618 PCVA-1
- c. Cleanliness Standard MSFC-STD-164(D)
- d. Test Plan CCSD-FO-1108-1F
- e. Test Procedure TP-RE-CCSD-FO-1108-2F
- f. CCSD ICC - February 1, 1967 - J. O. Weldon

## SECTION II

### RECEIVING INSPECTION

#### 2.1 TEST REQUIREMENTS

2.1.1 The test specimen and test, specimen probe shall be visually and dimensionally inspected for conformance with the applicable specifications prior to testing.

2.1.2 The test specimen valve and test specimen probe shall be checked to assure that the probe can only be inserted into the valve body for which it was designed and can only be inserted in one way. All index pins locations shall be recorded for the valve and probe.

#### 2.2 TEST PROCEDURE

2.2.1 A visual and dimensional inspection of the specimen was performed to determine compliance with NASA drawing 75M09618 PCVA-1 and applicable vendor drawings to the extent possible without disassembly of the specimen. At the same time the specimen was inspected for poor workmanship and manufacturing defects.

#### 2.3 TEST RESULTS

2.3.1 The specimen and probe conformed to NASA drawing 75M09618 PCVA-1 and the applicable vendor drawing 2-9064-C and 2-9074B and specifications. No evidence of poor workmanship or manufacturing defects was observed.

2.3.2 The probe has no provisions to prevent the interchanging from one system to another or to another calibration valve.

#### 2.4 TEST DATA

The data presented in table 2-1 were recorded during the receiving inspection.



Table 2-1. Specimen Specifics

|                       |                                    |
|-----------------------|------------------------------------|
| Name                  | Calibration Valve                  |
| Manufacturer          | Sage Engineering and Valve Company |
| Valve P/N             | 2-9064-C                           |
| Valve S/N             | 3668                               |
| Probe P/N             | 2-9074B                            |
| Probe S/N             | 3850                               |
| Pressure              | 6000 psig                          |
| Valve Length          | 1-7/8 inches                       |
| Valve Width           | 13/16 inch                         |
| Valve Height          | 2-5/16 inches                      |
| Probe Length          | 2-39/64 inches                     |
| Fitting Size          | MC240-4                            |
| Customer No.<br>Valve | 75M09618 FCVA-1                    |
| Customer No.<br>Probe | 75M07278                           |

## SECTION III

### PROOF PRESSURE TEST

#### 3.1 TEST REQUIREMENTS

- 3.1.1 The specimen valve **shall** be pressurized to 9000 psig for 15 minutes .
- 3.1.2 The specimen probe shall be inserted in the specimen (valve) during the last 5 minutes of the 15 minute pressurization period.
- 3.1.3 The test medium shall be deionized water.
- 3.1.4 The specimen valve and specimen probe shall be checked for leakage and distortion.

#### 3.2 TEST PROCEDURE

- 3.2.1 Specimen valve 1 was installed in the test setup as shown in figures 3-1 and 3-2 using the equipment listed in table 3-1. All hand valves were closed. Specimen probe 7 was not inserted.
- 3.2.2 Hand valve 4 was opened. Pump 3 was operated, pressurizing the specimen valve to 9000 psig. The pressure was monitored on gage 5.
- 3.2.3 Hand valve 4 was closed. The specimen valve was checked for leakage for ten minutes by monitoring gage 5 for a drop in pressure.
- 3.2.4 The specimen valve pressure was recorded at the beginning and at the end of the ten minute period.
- 3.2.5 At the end of the ten minute period, specimen probe 7 was inserted into specimen 1 without reducing pressure. The specimen valve and specimen probe were checked for leakage for five minutes by monitoring gage 5.
- 3.2.6 The specimen valve pressure was recorded at the beginning and at the end of the five minute period.
- 3.2.7 Hand valve 6 was opened. The specimen and system were vented to zero psig. The specimen valve and specimen probe were inspected for distortion.

#### 3.3 TEST RESULTS

- 3.3.1 The specimen valve was successfully subjected to 9000 psig for 15 minutes with no observable leakage.
- 3.3.2 The specimen probe was successfully inserted into the specimen valve during the last 5 minutes of the 15 minute pressurization period with no observable leakage.

3.3.3 The specimen valve and specimen probe were Visually inspected after the 15 minute pressurization period. No evidence of damage or distortion was observed.

#### 3.4 TEST DATA

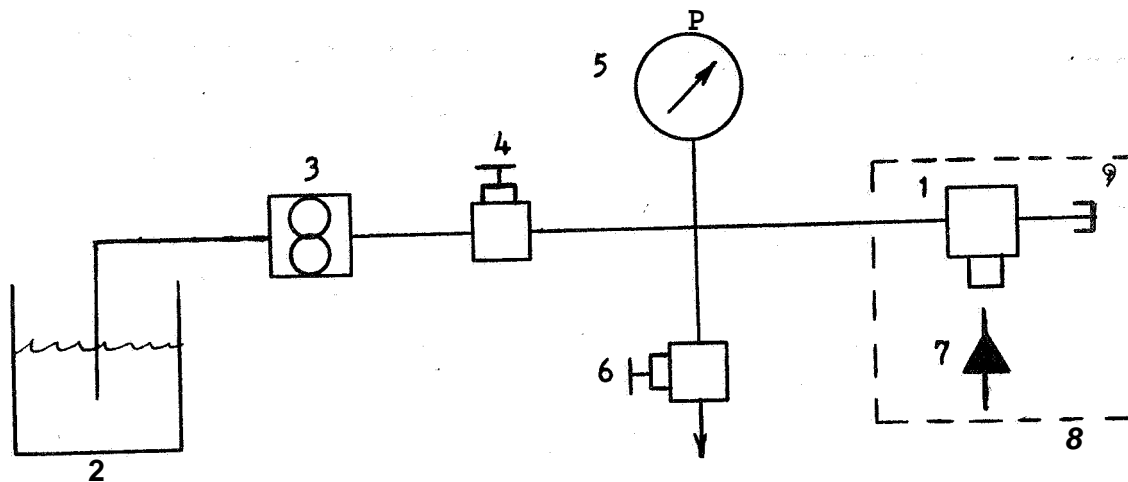
The data recorded during the proof pressure test are presented in table 3-2.

Table 3-1. Proof Pressure Test Equipment List

| Item No. | Item                | Manufacturer                   | Model/Part No. | Serial No. | Remarks   |
|----------|---------------------|--------------------------------|----------------|------------|---|
| 1        | Test Specimen Valve | Sage Engineering and Valve Co. | 2-9064-C       | 3668       | 1/4-inch calibration valve                        |
| 2        | Reservoir           | CCSD                           | NA             | NA         | Deionized water                                   |
| 3        | Pump                | Sprague Eng. Corp.             | NA             | 300-16-64  | 50,000-psig                                       |
| 4        | Hand Valve          | Aminco                         | 50011-A        | NA         | 1/4-inch  |
| 5        | Pressure Gage       | Astra                          | NA             | D11893-A   | 0-to 100,000-psig<br>±0.5% FS<br>Cal date 1-28-67 |
| 6        | Hand Valve          | Aminco                         | 50011-A        | NA         | 1/4-inch  |
| 7        | Specimen Probe      | Sage Engineering and Valve Co. | 2-9074B        | 3850       |   |
| 8        | Burst Chamber       | CCSD                           | NA             | 201344     | 3 ft by 3 ft by 3 ft                              |
| 9        | Pressure Cap        | Aminco                         | NA             | NA         | 1/4-inch  |

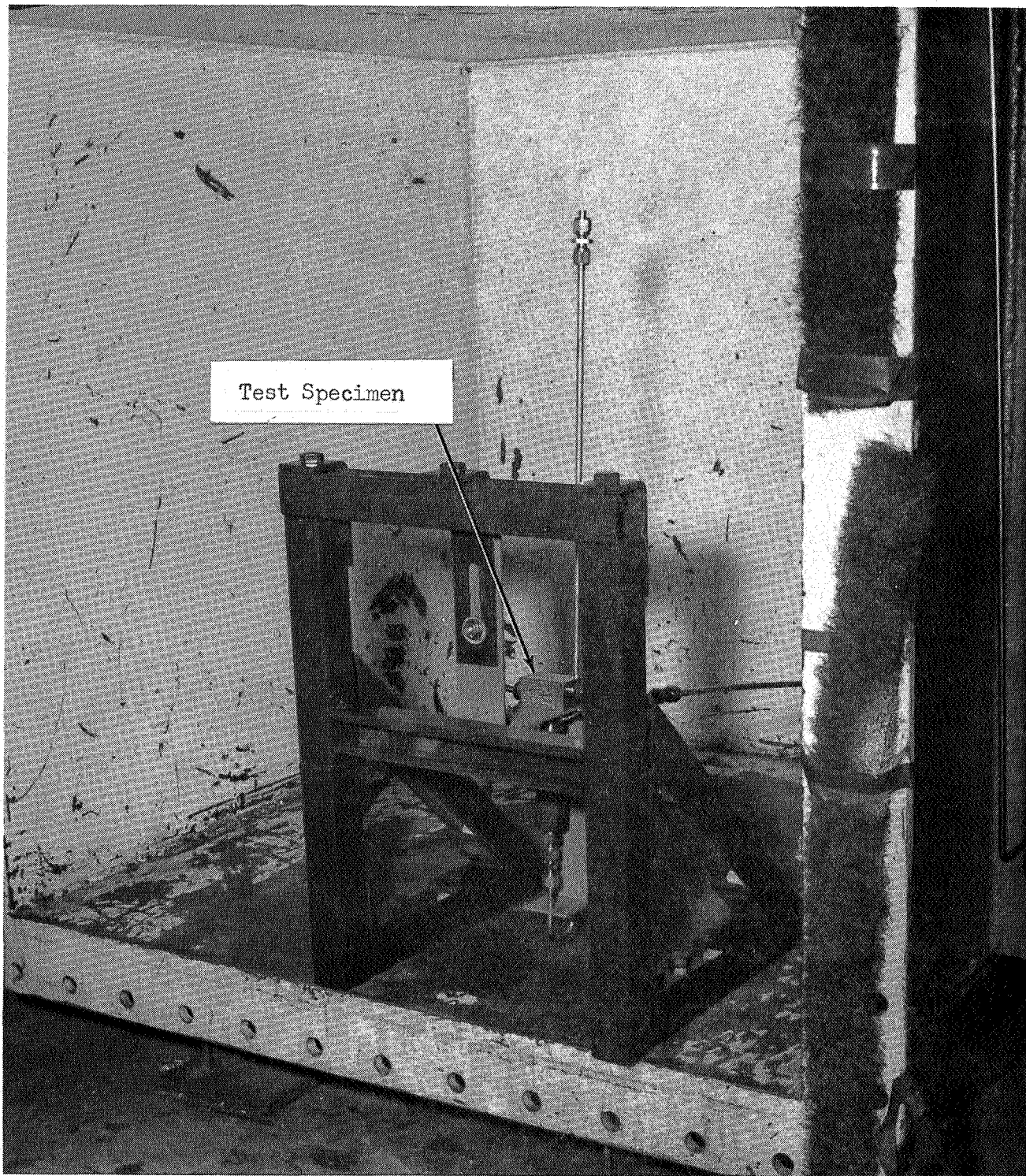
Table 3-2. Proof Pressure Test Data

|            |  |
|------------|--|
| Pressure   | 6000 psig for 15 minutes.<br>Last 5 minutes probe inserted |
| Leakage    | None   |
| Distortion | None   |



Note: All lines  $\frac{1}{4}$  inch.  
Refer to table 3-1 for item identification.

Figure 3-1. Proof Pressure Test Schematic



**Figure 3-2. Proof Pressure Test Setup**

## SECTION IV

### FUNCTIONAL TEST

#### 4.1 TEST REQUIREMENTS

- 4.1.1 The specimen valve outlet pressure **shall** equal the inlet pressure.
- 4.1.2 The specimen valve outlet pressure shall equal the specimen probe pressure while the specimen valve inlet is pressurized to 6000 psig.
- 4.1.3 The specimen valve shall be checked for internal and external leakage at 6000 psig using helium as the test medium.
- 4.1.4 The specimen valve with the specimen probe inserted shall be checked for internal and external leakage at 6000 psig, using helium as the test medium.

#### 4.2 TEST PROCEDURE

- h.2.1 The specimen valve was installed in the test setup as shown in figures 4-1 and 4-2 using the equipment listed in table 4-1. The specimen valve was submerged in water bath 14. All hand valves were closed,
- 4.2.2 The inlet of hand valve 4 was pressurized to 6000 psig using helium pressure source 2.
- 4.2.3 Hand valves 4 and 17 were opened. Regulator 7 was adjusted, pressurizing the inlet of the specimen valve to 2000, 4000 and 6000 psig. The inlet pressure was monitored on gage 8 and the outlet pressure was monitored on gage 10.
- 4.2.4 The equality between inlet and outlet pressure of the specimen valve was checked at 2000, 4000, and 6000 psig. The data were recorded.
- 4.2.5 The specimen valve internal leakage was checked by monitoring the probe port for the appearance of bubbles. The external Leakage was checked by monitoring the valve body and fitting for the appearance of bubbles. No leakage was allowed. The data were recorded.
- 4.2.6 Hand valve 13 was opened and specimen probe 16 was inserted. When the specimen valve outlet pressure dropped to 1000 psig, as monitored on gage 10, hand valve 13 was closed.
- 4.2.7 Regulator 11 was adjusted, pressurizing the specimen probe to 2000, 4000 and 6000 psig as monitored on gage 12,
- 4.2.8 The equality between the specimen valve outlet pressure and the specimen probe pressure was checked at 2000, 4000 and 6000 psig. The data were recorded,

- 4.2.9 Regulator 11 was readjusted to zero outlet pressure, hand valve 13 was opened, and the probe pressure was vented to zero.
- 4.2.10 Regulator 7 was readjusted to zero outlet pressure, hand valve 9 was opened, and the specimen valve inlet was vented to zero pressure.
- 4.2.11 Hand valves 17 and 13 were closed, and hand valve 18 was opened. The outlet of hand valve 18 was connected to a tube submerged in water bath 14.
- 4.2.12 Regulator 11 was adjusted to maintain 6000 psig on the specimen probe. Pressure was monitored on gage 12. The internal leakage from the specimen valve inlet was checked by monitoring the submerged tube for the appearance of bubbles. The external leakage was checked by monitoring the valve body, probe connection, and end fittings of the specimen valve for the appearance of bubbles. No leakage was allowed. The data were recorded.
- 4.2.13 Regulator 11 was readjusted to zero outlet pressure and hand valves 13 and 15 were opened and the pressure on the specimen valve and specimen probe was vented to zero psig.

#### 4.3 TEST RESULTS

- 4.3.1 The specimen valve inlet and outlet pressure were determined to be equal.
- 4.3.2 The specimen valve outlet pressure and probe pressure were determined to be equal while the inlet of the specimen was pressurized to 6000 psig.
- 4.3.3 The specimen valve with the probe inserted was checked for internal and external leakage at 6000 psig. No evidence of internal or external leakage was observed.

#### 4.4 TEST DATA

The data recorded during the functional test are presented in table 4-2.



Table 4-1. Functional Test Equipment List

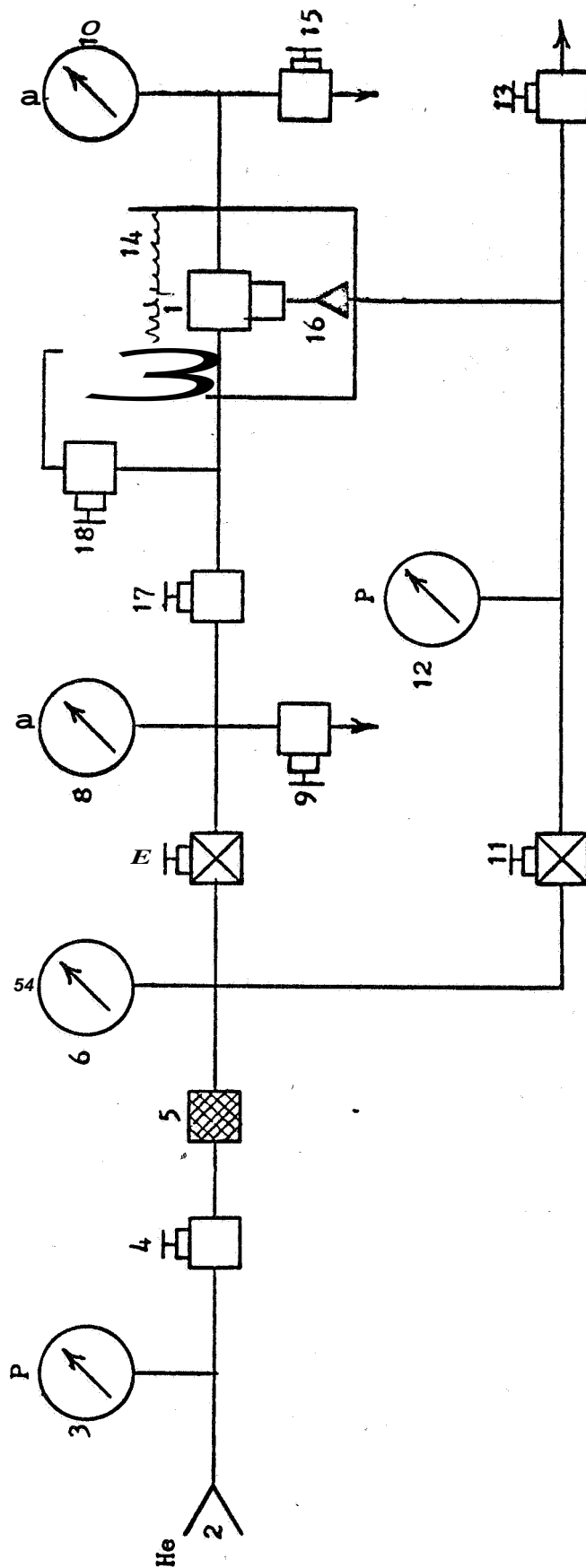
| Item No. | Item               | Manufacturer                   | Model/<br>Part No. | Serial<br>No. | Remarks   |
|----------|--------------------|--------------------------------|--------------------|---------------|---|
| 1        | Test Specimen      | Sage Engineering and Valve Co. | 2-9064-            | 3668          | 1/4-inch calibration valve                            |
| 2        | Helium Source      | CCSD                           | NA                 | NA            | 6000-psig   |
| 3        | Pressure Gage      | Ashcroft                       | NA                 | 95-1508-      | 20,000-psig<br>$\pm 1.0\%$ FS<br>Cal date 1-7-67      |
| 4        | Hand Valve         | Aminco                         | 13126              | NA            | 1/4-inch  |
| 5        | Filter             | Fluid Dynamics                 | FL-20-8            |               | 2-micron  |
| 6        | Pressure Gage      | Ashcroft                       | NA                 | 200613-2      | 0-to 20,000-psig<br>$\pm 1.0\%$ FS<br>Cal date 1-7-67 |
| 7        | Pressure Regulator | Tescom Corp.                   | 26-1021-20         | 3024          | 0-to 10,000-psig                                      |
| 8        | Pressure Gage      | Heise                          | H-34955            | 01423 1       | 0-to 10,000-psig<br>$\pm 0.1\%$ FS<br>Cal date 1-9-67 |
| 9        | Hand Valve         | Aminco                         | 13126              |               | 1/4-inch  |
| 10       | Pressure Gage      | Heise                          | H-49480            | 95-1653-B     | 0-to 10,000-psig<br>$\pm 0.1\%$ FS<br>Cal date 2-1-67 |
| 11       | Pressure Regulator | Tescom Corp.                   | 26-1021-10         | 1529          | 0-to 10,000-psig                                      |
| 12       | Pressure Gage      | Heise                          | H-49479            | 95-1652-B     | 0-to 10,000-psig<br>$\pm 0.1\%$ FS<br>Cal date 2-1-67 |
| 13       | Hand Valve         | Robbins                        | SSKG-250-4T        |               | 1/4-inch  |
| 14       | Water Bath         | CCSD                           | NA                 | NA            |   |
| 15       | Hand Valve         | Robbins                        | SSKG-250-4T        |               | 1/4-inch  |
| 16       | Specimen Probe     | Sage Engineering and Valve Co. | 2-9074B            | 3290          |   |

Table 4-1. Functional Test Equipment List (Continued)

| Item No. | Item       | Manufacturer | Model/<br>Part No. | Serial No. | Remarks  |
|----------|------------|--------------|--------------------|------------|----------|
|          |            | Manufacturer | Part No.           |            |          |
| 17       | Hand Valve | Robbins      | SSKG-250<br>-4T    |            | 1/4-inch |
| 18       | Hand Valve | Robbins      | SSKG-250<br>-4T    |            | 1/4-inch |

Table 4-2. Functional Test Data

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2033   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

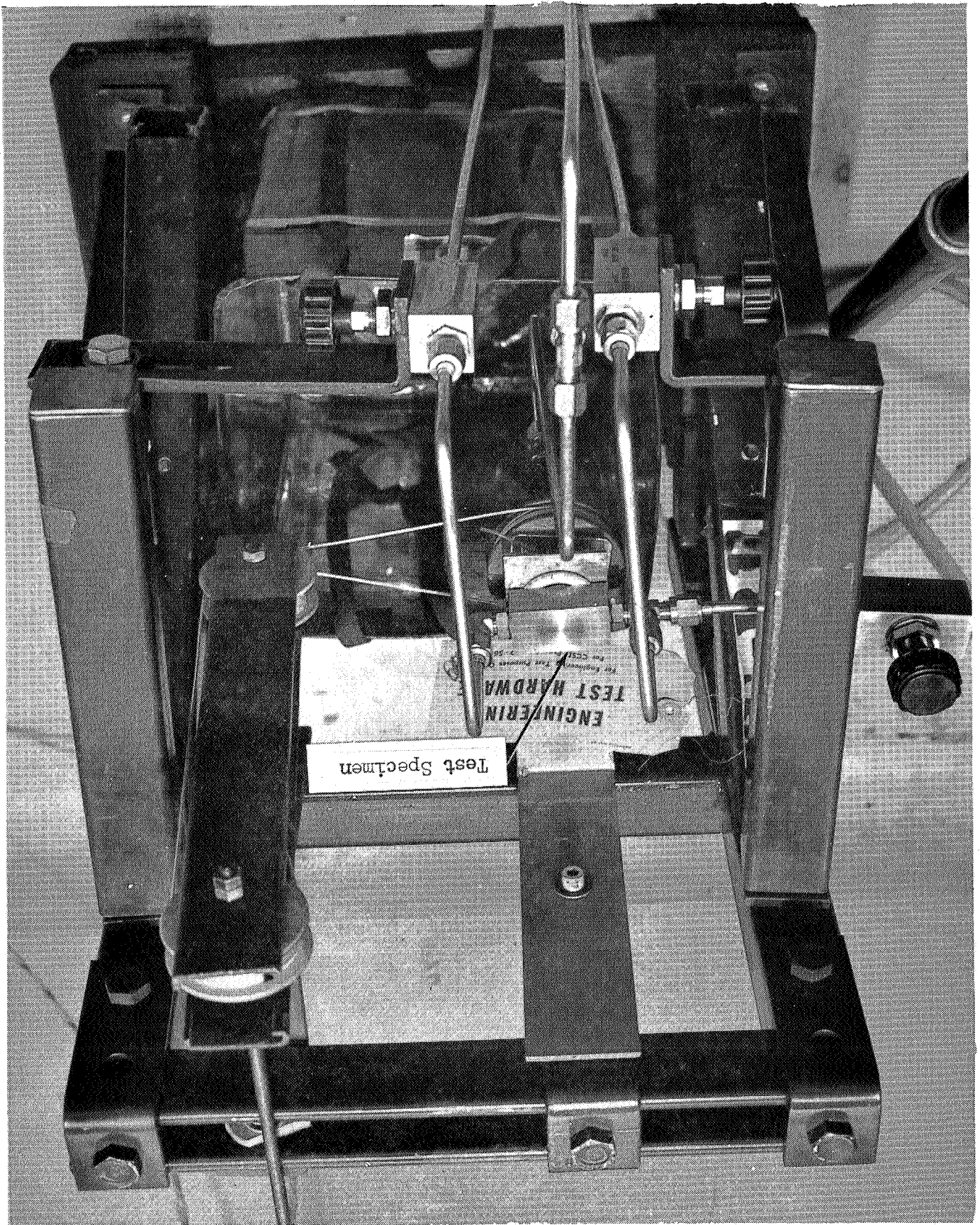


Note: All lines  $\frac{1}{4}$  inch.  
Refer to table 4-1 for item identification.

Figure 4-1. Functional Test Schematic

Figure 4-2. Functional Test Setup

4-6



## SECTION V

### LOW TEMPERATURE TEST

#### 5.1 TEST REQUIREMENTS

- 5.1.1 The specimen valve and probe shall be subjected to a low temperature test at 5 (+0, -4)°F, as specified in KSC-STD-164(D) and pressurized to 6000 psig with helium during the test.
- 5.1.2 The specimen valve and probe shall be subjected to a functional test as specified in section IV during and after the low temperature test.

#### 5.2 TEST PROCEDURE

- 5.2.1 The specimen valve and probe was installed in the test setup as shown in figures 5-1 and 5-2 using the equipment listed in table 5-1.
- 5.2.2 The specimen and specimen probe test setup as shown in figure 4-2 was placed in the low temperature chamber. The inlet of the specimen valve was pressurized to 6000 psig as described in 4.2.1 through 4.2.3, except for the water in the water bath 14. The water was replaced with alcohol during this test.
- 5.2.3 The temperature of the chamber was lowered to a temperature of 5 (+0, -4)°F. The specimen valve and probe temperature was allowed to stabilize at 5°F.
- 5.2.4 After the specimen valve and probe temperature was stabilized at 5°F, a functional test was performed as described in section IV.
- 5.2.5 The specimen and low temperature chamber were allowed to return to ambient conditions after completion of the functional test at 5°F.
- 5.2.6 The specimen valve and probe were subjected to a functional test as described in section IV upon return to ambient conditions.

#### 5.3 TEST RESULTS

- 5.3.1 The specimen valve and probe were successfully subjected to low temperature of 5°F as specified in KSC-STD-164(D) while pressurized at 6000 psig.
- 5.3.2 The specimen valve and probe were successfully subjected to a functional test as specified in section IV during and after the low temperature test. No evidence of leakage was observed.

#### 5.4 TEST DATA

The data recorded during the low temperature test are presented in tables 5-2 and 5-3.

Table 5-1. Low Temperature Test Equipment List

| Item No. | Item               | Manufacturer                   | Model/<br>Part No. | Serial No. | Remarks   |
|----------|--------------------|--------------------------------|--------------------|------------|---|
| 1        | Test Specimen      | Sage Engineering and Valve Co. | 2-9064-C           | 3668       | 1/4-inch Cali-<br>bration valve                 |
| 2        | Helium Source      | CCSD                           | NA                 | NA         | 6000-psig                                       |
| 3        | Pressure Gage      | Ashcroft                       | NA                 | 95-1508-B  | 20,000-psig<br>+1.0% FS<br>Cal date 1-7-67      |
| 4        | Hand Valve         | Aminco                         | 13126              | NA         | 1/4-inch  |
| 5        | Filter             | Fluid Dynamics                 | FL-20-8            |            | 2-micron  |
| 6        | Pressure Gage      | Ashcroft                       | NA                 | 200613-2   | 0-to 20,000-psig<br>+1.0% FS<br>Cal date 1-7-67 |
| 7        | Pressure Regulator | Tescom Corp.                   | 26-1021-20         | 3024       | 0-to 10,000-psig                                |
| 8        | Pressure Gage      | Heise                          | H-34955            | 014231     | 0-to 10,000-psig<br>±0.1% FS<br>Gal date 1-9-67 |
| 9        | Hand Valve         | Aminco                         | 13126              |            | 1/4-inch  |
| 10       | Pressure Gage      | Heise                          | H-49480            | 95-1653-B  | 0-to 10,000-psig<br>±0.1% FS<br>Gal date 2-1-67 |
| 11       | Pressure Regulator | Tescom Corp.                   | 26-1021-10         | 1529       | 0-to 10,000-psig                                |
| 12       | Pressure Gage      | Heise                          | H-49479            | 95-1652-B  | 0-to 10,000-psig<br>±0.1% FS<br>Cal date 2-1-67 |
| 13       | Hand Valve         | Robbins                        | SSKG-250-4T        |            | 1/4-inch  |
| 14       | Water Bath         | CCSD                           | NA                 | NA         |   |
| 15       | Hand Valve         | Robbins                        | SSKG-250-4T        | NA         | 1/4-inch  |
| 16       | Specimen Probe     | Sage Engineering and Valve Co. | 2-9074B            | 3850       |   |

Table 5-1. Low Temperature Test Equipment List (Continued)

| Item No. | Item                | Manufacturer | Model/Part No. | Serial No. | Remarks  |
|----------|---------------------|--------------|----------------|------------|----------|
| 17       | Hand Valve          | Robbins      | SSKG-250-4T    |            | 1/4-inch |
| 18       | Hand Valve          | Robbins      | SSKG-250-4T    |            | 1/4-inch |
| 19       | Temperature Chamber | CCSD         | NA             | NA         |          |

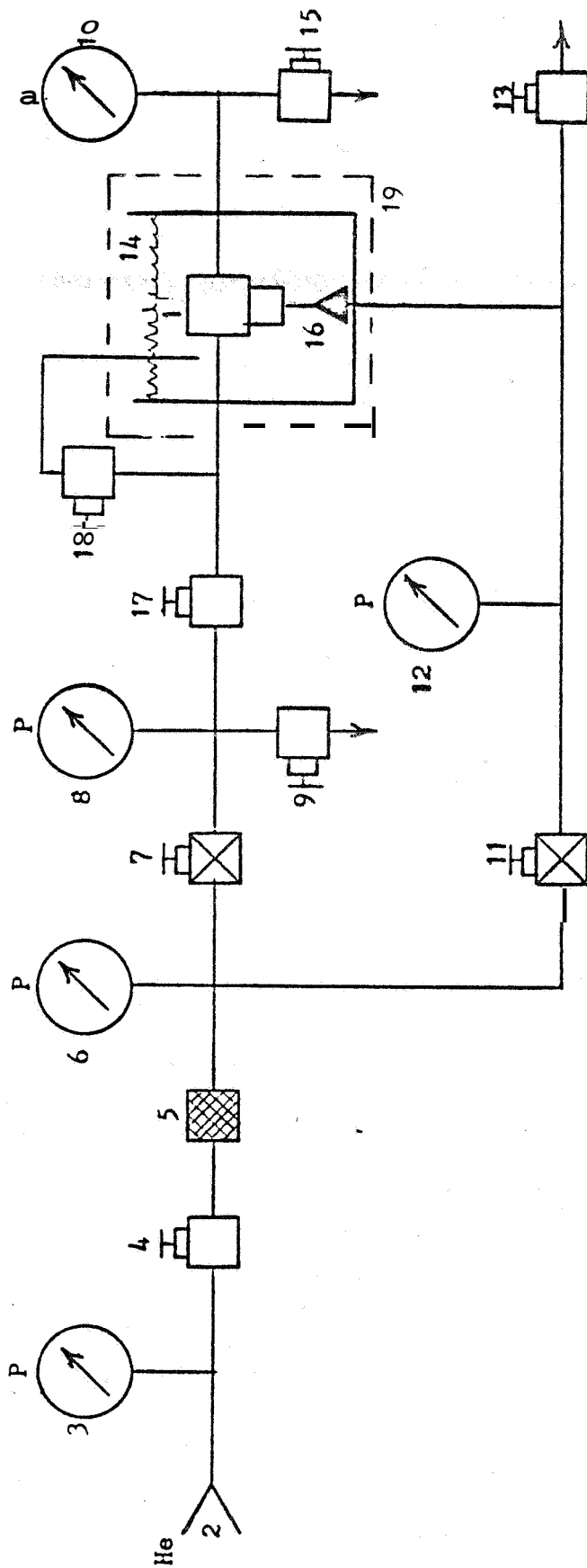
Table 5-2. Functional Test Data Obtained During Low Temperature Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

Table 5-3. Functional Test Data Obtained After Low Temperature Test

| Specimen Valve  |       |        |          |          |
|-----------------|-------|--------|----------|----------|
| Pressure (psig) |       |        | Leakage  |          |
| Inlet           | Probe | Outlet | Internal | External |
| 2000            | 0     | 2000   | None     | None     |
| 4000            | 0     | 4000   | None     | None     |
| 6000            | 0     | 6000   | None     | None     |
| 6000            | 2000  | 2053   | None     | None     |
| 6000            | 4000  | 4000   | None     | None     |
| 6000            | 6003  | 6000   | None     | None     |
| Tube in water   | 6000  | 6000   | None     | None     |





**Note:** All lines  $\frac{1}{4}$  inch.  
Refer to table 5-1 for item identification.

Figure 5-1. Low Temperature Test Schematic



Figure 5-2. Low Temperature Test Setup

## SECTION VI

### HIGH TEMPERATURE TEST

#### 6.1 TEST REQUIREMENTS

- 6.1.1 The specimen valve and probe shall be subjected to a high temperature test at 140 (+4, -0)°F as specified in KSC-STD-164(D) and pressurized to 6000 psig with helium during the test.
- 6.1.2 The specimen valve and probe shall be subjected to a functional test as specified in section IV during and after the high temperature test.

#### 6.2 TEST PROCEDURE

- 6.2.1 The specimen valve and probe was installed in the test setup as shown in figures 6-1 and 6-2 using the equipment listed in table 6-1.
- 6.2.2 The specimen valve and probe and test setup as shown in figure 4-2 were placed in the high temperature chamber. The inlet of the specimen valve was pressurized to 6000 psig as described in 4.2.1 through 4.2.3.
- 6.2.3 The temperature of the chamber was raised to a temperature of 140 (+4, -0)°F. The specimen valve and probe and the chamber were allowed to stabilize. After the specimen and chamber had stabilized, the temperature of the chamber was maintained for 72 hours.
- 6.2.4 During the 72 hours period the specimen valve and probe were subjected to a functional test as described in section IV.
- 6.2.5 The specimen valve and probe and the high temperature chamber were allowed to return to ambient conditions after the 72 hour period.
- 6.2.6 The specimen valve and probe were subjected to a functional test as described in section IV, upon return to ambient conditions.

#### 6.3 TEST RESULTS

- 6.3.1 The specimen valve and probe were successfully subjected to the high temperature of 140°F for 72 hours as specified in KSCSTD-164(D) while pressurized at 6000 psig.
- 6.3.2 The specimen valve and probe were successfully subjected to a functional test as specified in section IV during and after the high temperature test. No evidence of leakage was observed.

TEST DATA

The data recorded during the high temperature test are presented in table 6-2 and 6-3.

Table 6-1. High Temperature Test Equipment List

| Item No. | Item               | Manufacturer                   | Model/<br>Part No. | Serial No. | Remarks   |
|----------|--------------------|--------------------------------|--------------------|------------|---|
| 1        | Test Specimen      | Sage Engineering and Valve Co. | 2-9064-C           |            |   |
| 2        | Helium Source      | CGSD                           | NA                 | NA         | 6000-psig   |
| 3        | Pressure Gage      | Ashcroft                       | NA                 | 95-1508-B  | 20,000-psig<br>$\pm 1.0\%$ FS<br>Cal date 1-7-67      |
| 4        | Hand Valve         | Aminco                         | 13126              | NA         | 1/4-inch  |
| 5        | Filter             | Fluid Dynamics                 | FL-20-8            | NA         | 2-micron  |
| 6        | Pressure Gage      | Ashcroft                       | NA                 | 200613-2   | 0-to 20,000-psig<br>$\pm 1.0\%$ FS<br>Cal date 1-7-67 |
| 7        | Pressure Regulator | Tescom Corp.                   | 26-1021-20         | 3024       | 0-to 10,000-psig                                      |
| 8        | Pressure Gage      | Heise                          | H-34955            | 014231     | 0-to 10,000-psig<br>$\pm 0.1\%$ FS<br>Cal date 1-9-67 |
| 9        | Hand Valve         | Aminco                         | 13126              | NA         | 1/4-inch  |
| 10       | Pressure Gage      | Heise                          | H-49480            | 95-1653-E  | 0-to 10,000-psig<br>$\pm 0.1\%$ FS<br>Cal date 2-1-47 |
| 11       | Pressure Regulator | Tescom Corp.                   | 26-1021-10         | 1529       | 0-to 10,000-psig                                      |
| 12       | Pressure Gage      | Heise                          | H-49479            | 95-1652-B  | 0-to 10,000-psig<br>$\pm 0.1\%$ FS<br>Cal date 2-1-67 |
| 13       | Hand Valve         | Robbins                        | SSKG-250-4T        | NA         | 1/4-inch  |
| 14       | Water Bath         | CGSD                           | NA                 | MA         |   |
| 15       | Hand Valve         | Robbins                        | SSKG-250-LT        | NA         | 1/2-inch  |

Table 6-1. High Temperature Test Equipment List (Continued)

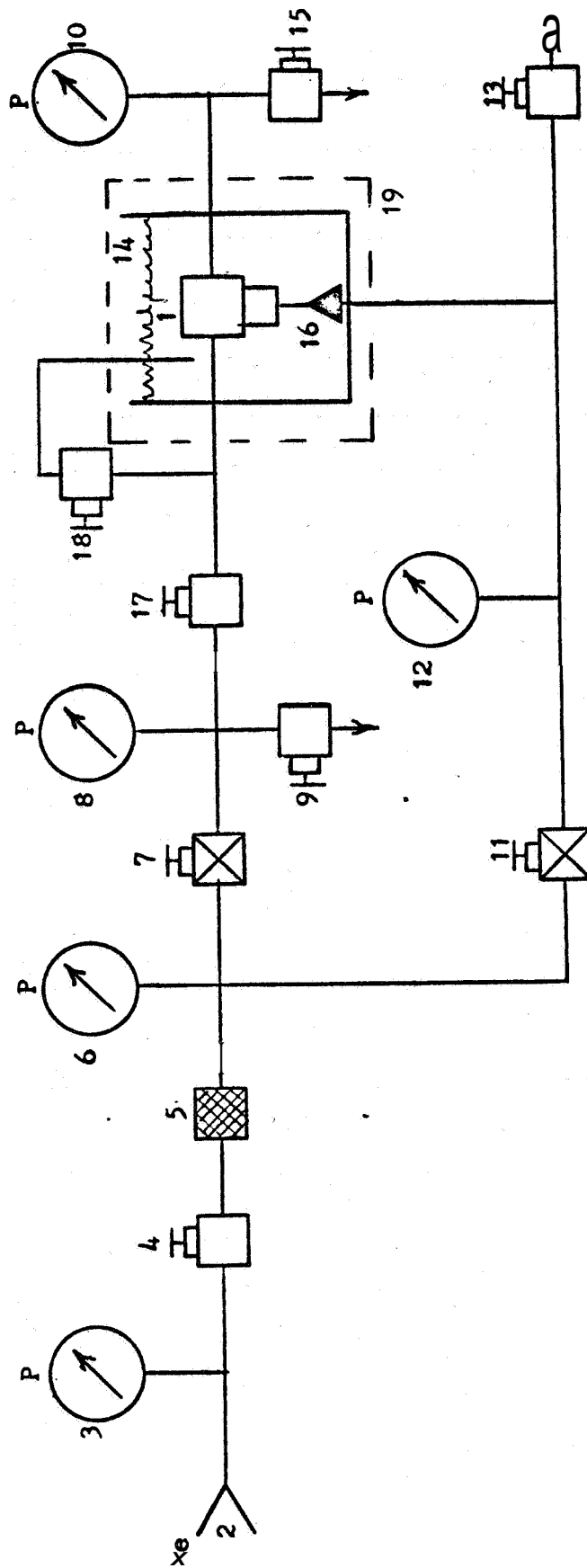
| Item No. | Item                | Manufacturer                   | Model/<br>Part No. | Serial No. | Remarks  |
|----------|---------------------|--------------------------------|--------------------|------------|----------|
| 16       | Specimen Probe      | Sage Engineering and Valve Co. | 2-9074B            | 3290       |          |
| 17       | Hand Valve          | Robbins                        | SSKG-250<br>-4T    |            | 1/4-inch |
| 18       | Hand Valve          | Robbins                        | SSKG-250<br>-4T    |            | 1/4-inch |
| 19       | Temperature Chamber | CCSD                           | NA                 | NA         |          |

Table 6-2. Functional Test Data Obtained During High Temperature Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

Table 6-3. Functional Test Data Obtained After High Temperature Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |



Note: All lines  $\frac{1}{4}$  inch.  
Refer to table 6-1 for item identification.

Figure 6-1. High Temperature Test Schematic





**Figure 6-2. High Temperature Test Setup**

## SECTION VII

### SURGE TEST

#### 7.1 TEST REQUIREMENTS

- 7.1.1 The inlet port of the specimen valve shall be subjected to 10 pressure surges and the calibration port shall be subjected to 10 pressure surges.
- 7.1.2 Each pressure surge shall consist of pressurizing the specimen valve and probe from zero psig to 6000 psig within 100 milliseconds.
- 7.1.3 The specimen valve and probe shall be checked for leakage during the surge test.
- 7.1.4 The specimen valve and probe shall be subjected to a functional test following the surge test.

#### 7.2 TEST PROCEDURE

- 7.2.1 The specimen valve and probe were installed in the test setup as shown in figures 7-1 and 7-3 using the equipment listed in table 7-1. All hand valves were closed.
- 7.2.2 The inlet of hand valve 5 was pressurized to 10,000 psig from helium pressure source 3. Hand valve 5 was opened, pressurizing the inlet of regulator to 10,000 psig. Pressure was monitored on gage 7.
- 7.2.3 Solenoid valve 10 was actuated to the open position. Regulator 8 was adjusted, pressurizing the inlet of the specimen valve to 6000 psig. The specimen inlet pressure was monitored on gage 9 and transducer 11. Solenoid valve 10 was deactuated and the specimen valve inlet pressure was vented to zero.
- 7.2.4 Solenoid valve 10 was actuated and the inlet of the specimen valve was pressurized to 6000 psig within 100 milliseconds. The pressure and the pressure rise rate were monitored with transducer 11 and oscillograph 12. Solenoid valve 10 was deactuated and the inlet of the specimen valve was vented to zero psig. The above procedure constituted one surge cycle.
- 7.2.5 The specimen valve inlet was subjected to 10 surges from zero psig to 6000 psig within 100 milliseconds.
- 7.2.6 The specimen probe port during the surges was monitored for leakage by observing the end of the submerged tube in water bath 16 for bubbles.
- 7.2.7 Regulator 8 was readjusted to zero outlet pressure. Hand valve 14 was opened and the inlet of the specimen valve was vented to zero psig. The specimen valve was removed from the test setup.

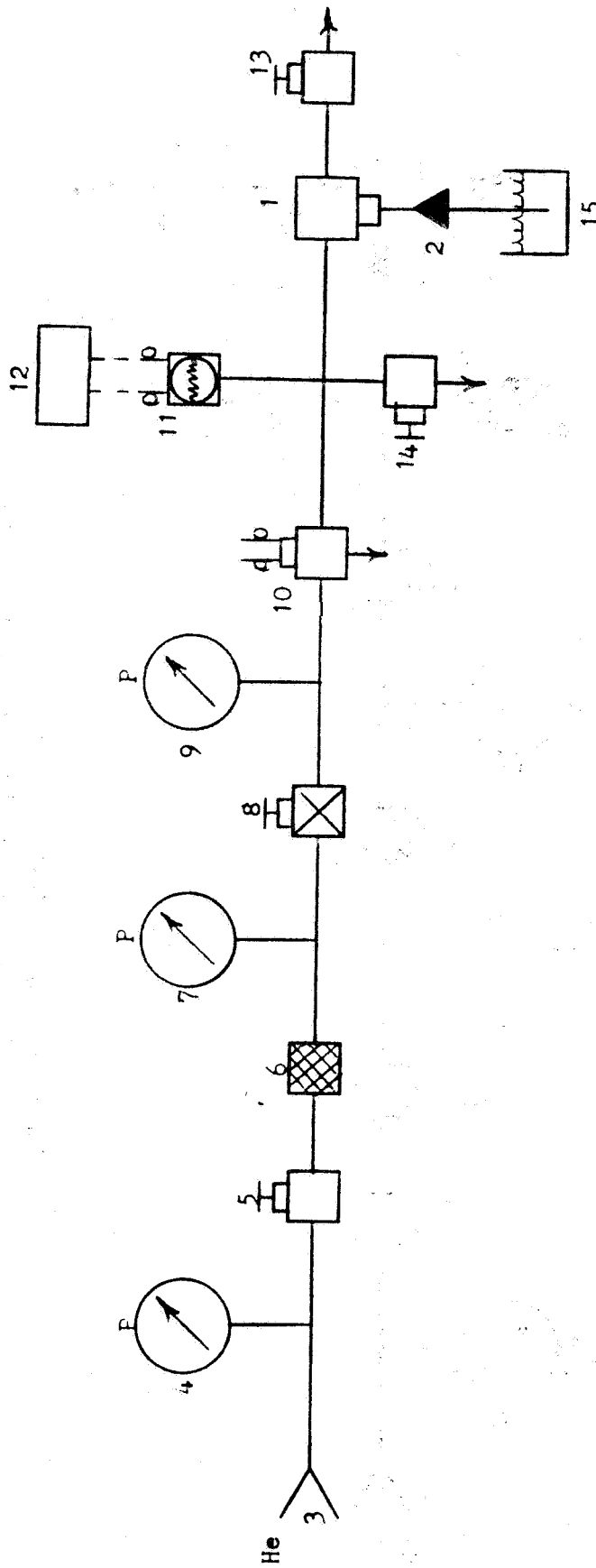
- 7.2.8 The specimen valve and probe were installed in the test setup as shown in figure 7-2 using the equipment listed in table 7-1. The probe was inserted into the specimen. Hand valve 13 was opened and hand valve 14 was closed.
- 7.2.9 Solenoid valve-10 was actuated to the open position. Regulator 8 was adjusted pressurizing the specimen probe to 6000 psig. The specimen probe port pressure was monitored on gage 9 and transducer 11. Solenoid valve 10 was closed and the port of the specimen probe was vented to zero psig.
- 7.2.10 Solenoid valve 10 was actuated and the port of the specimen probe was pressurized to 6000 psig within 100 milliseconds. The pressure and the pressure rise rate were monitored with transducer 11 and oscillograph 12. Solenoid valve 10 was de-actuated and the port of the specimen probe was vented to zero. The above procedure constituted one surge cycle.
- 7.2.11 The port of the specimen probe was subjected to 10 surges from zero to 6000 psig within 100 milliseconds.
- 7.2.12 The inlet of the specimen valve was monitored for leakage by observing the end of the submerged tubing in water bath 16 for bubbles during the surges.
- 7.2.13 A functional test was performed at the completion of the surge test.
- 7.3 TEST RESULTS
- 7.3.1 The specimen inlet port and the specimen calibration port each were successfully subjected to 10 pressure surges.
- 7.3.2 Each pressure surge consisted of pressurizing the specimen valve and probe from zero psig to 6000 psig within 100 milliseconds.
- 7.3.3 The specimen valve and probe were monitored for leakage during the surge test. No evidence of leakage was observed.
- 7.3.4 The specimen valve and probe were successfully subjected to a functional test, as specified in section IV, following the surge test. No evidence of leakage was observed.
- 7.4 TEST DATA
- The data recorded during the surge test are presented in tables 7-2 and figure 7-4.

Table 7-1. Surge Test Equipment List

| Item No. | Item                | Manufacturer                       | Model/Part No.      | Serial No. | Remarks   |
|----------|---------------------|------------------------------------|---------------------|------------|---|
| 1        | Specimen Valve      | Sage Engineering and Valve Co.     | 2-9064-             | 3668       | 1/4-inch calibration valve                      |
| 2        | Specimen Probe      | Sage Engineering and Valve Co.     | 2-9074B             | 3850       |   |
| 3        | He Source           | CCSD                               | NA                  | NA         | 10,000-psig                                     |
| 4        | Pressure Gage       | Ashcroft                           | NA                  | 5-1508-B   | 0-to 20,000-psig<br>±1.0% FS<br>Cal date 1-7-67 |
| 5        | Hand Valve          | Aminco                             | 13126               | NA         | 1/4-inch  |
| 6        | Filter              | Fluid Dynamics                     | FL 20-8-BB          | NA         | 2-micron  |
| 7        | Pressure Gage       | Ashcroft                           | NA                  | 00613-3    | 0-to 20,000-psig<br>±1.0% FS<br>Cal date 1-7-67 |
| 8        | Pressure Regulator  | Tescom Corp.                       | 26-1021-20          | 3024       | 0-to 10,000-psig                                |
| 9        | Pressure Gage       | Heise                              | 134955              | 014231     | 0-to 10,000-psig<br>±1.0% FS<br>Cal date 1-9-67 |
| 10       | Solenoid Valve      | Marotta                            | TV223C              | 108        | 1/4-inch, 3-way                                 |
| 11       | Pressure Transducer | Statham                            | VG 731TC<br>1.5-350 | 12210      | 0-to 7500-psig<br>Cal date 1-17-67              |
| 12       | Oscillograph        | Consolidated Electrodynamics Corp. | NA                  | 012587     | Cal date 1-28-67                                |
| 13       | Hand Valve          | Robbins                            | 3SKG-250-4T         | NA         | 1/4-inch  |
| 14       | Hand Valve          | Robbins                            | 3SKG-250-4T         | NA         | 1/4-inch  |
| 15       | Water Bath          | CCSD                               | NA                  | NA         |   |
| 16       | Pressure Cap        | Aminco                             | NA                  | NA         | 1/4-inch  |

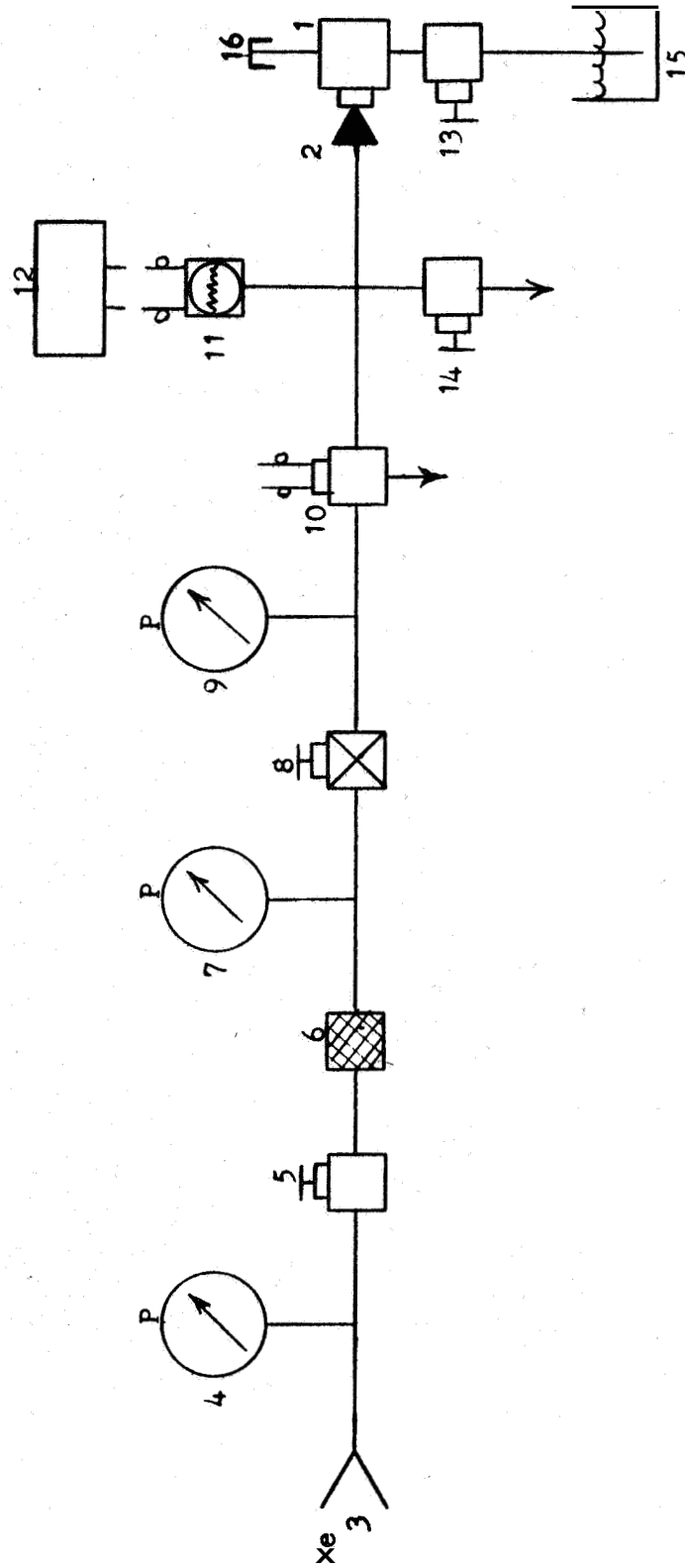
Table 7-2. Functional Test Data Obtained After Surge Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 2000                         | 2000  | 2000   | None     | None     |
| 4000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |



Note: All lines  $\frac{1}{4}$  inch,  
refer to table 7-1 for item identification.

Figure @-1 Surge Test Schematic (Valve Inlet)



Note: All lines  $\frac{1}{2}$  inch.  
Refer to table 7-1 for item identification.

Figure 7-2. Surge Test Schematic (Probe Inlet)



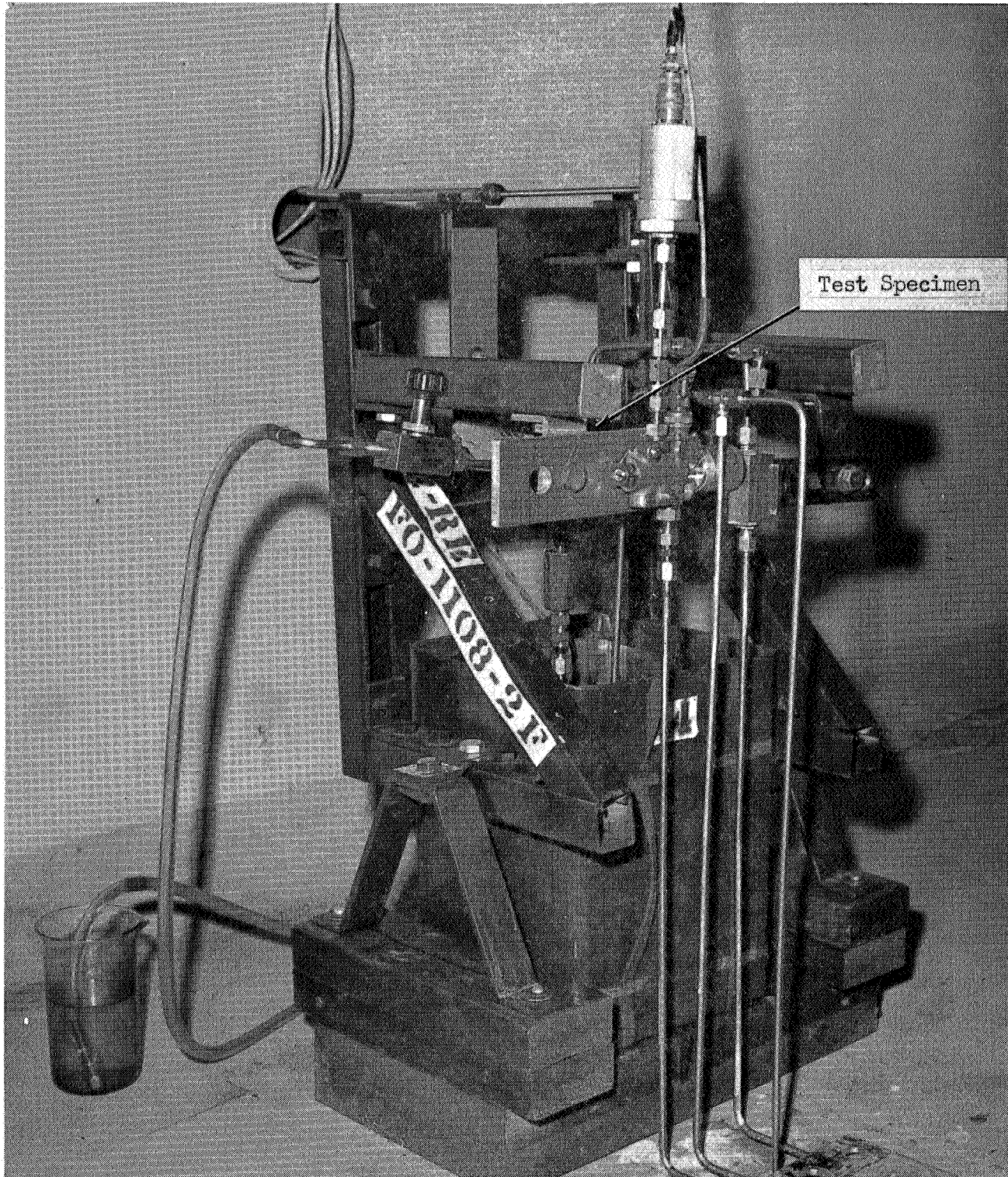
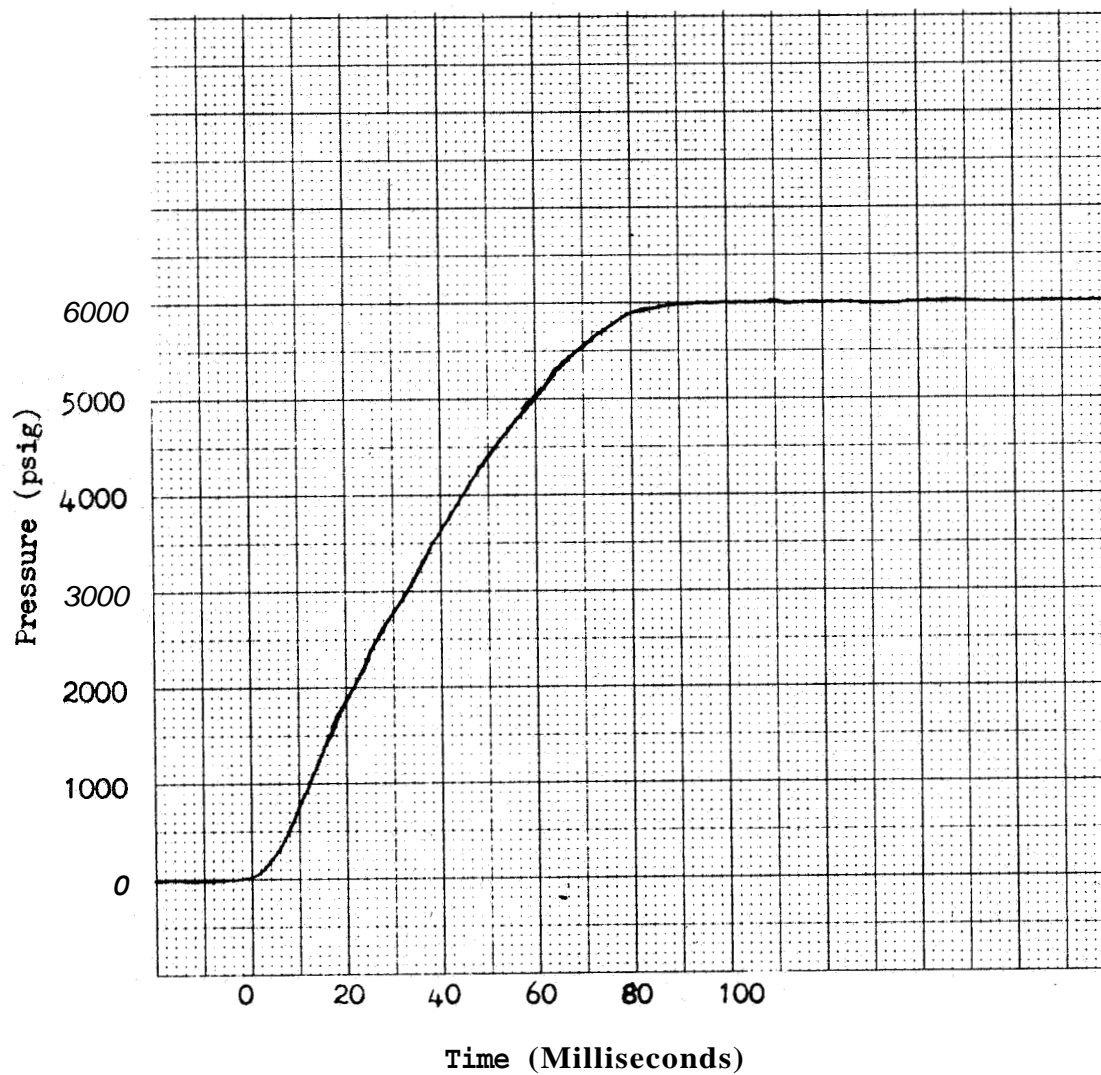


Figure 7-3. Surge Test Setup





**Figure 7-4. Typical Surge Test Waveform**

## SECTION VIII

### SALT FOG TEST

#### 8.1 TEST REQUIREMENTS

- 8.1.1 A salt fog test shall be performed on the test specimen valve to determine the resistance of the specimen valve to a salt atmosphere.
- 8.1.2 The salt fog test shall be performed in accordance with section 17 of KSC-STD-164(D) .
- 8.1.3 The test specimen shall be exposed to the salt fog for 240 (+2) hours. All ports of the specimen valve shall be capped during exposure to the salt atmosphere.
- 8.1.4 A functional test shall be performed on the specimen valve upon completion of the salt fog test.

#### 8.2 TEST PROCEDURE

- 8.2.1 The specimen valve was visually inspected for corrosion, dirt, and oily films. Oily films, other than those required for normal service usage, and all dirt particles were removed. The specimen valve was placed in the salt fog chamber using the equipment' as listed in table 8-1.
- 8.2.2 The temperature in the exposure zone was maintained at 95 (+2, -4)°F. The salt fog conditions in the exposure zone were maintained such that a clean fog-collecting receptacle placed at any point in the exposure zone will collect from 0.5 to 3 milliliters of salt solution per hour for each 80 square centimeters of horizontal collecting area (10 centimeters diameter), based on an average test of at least 16 hours. The salt solution consisted of five parts by weight of sodium chloride and 95 parts by weight of water.
- 8.2.3 The specimen valve was exposed to the salt fog conditions for 240 (+2) hours.
- 8.2.4 After completion of the exposure test, the specimen valve was removed from the chamber and the salt deposits were removed from the specimen to the extent necessary to make mechanical connections. Within 1 hour after completing the exposure period, a functional test as specified in section IV was performed.

#### 8.3 TEST RESULTS

- 8.3.1 The specimen valve was exposed to a salt fog atmosphere for a period of 240 hours as specified in KSC-STD-164(D) with no adverse effects.
- 8.3.2 The specimen valve and probe were successfully subjected to a functional test as specified in section IV within one hour after

the completion of the salt fog test.

#### 8.4

#### TEST DATA

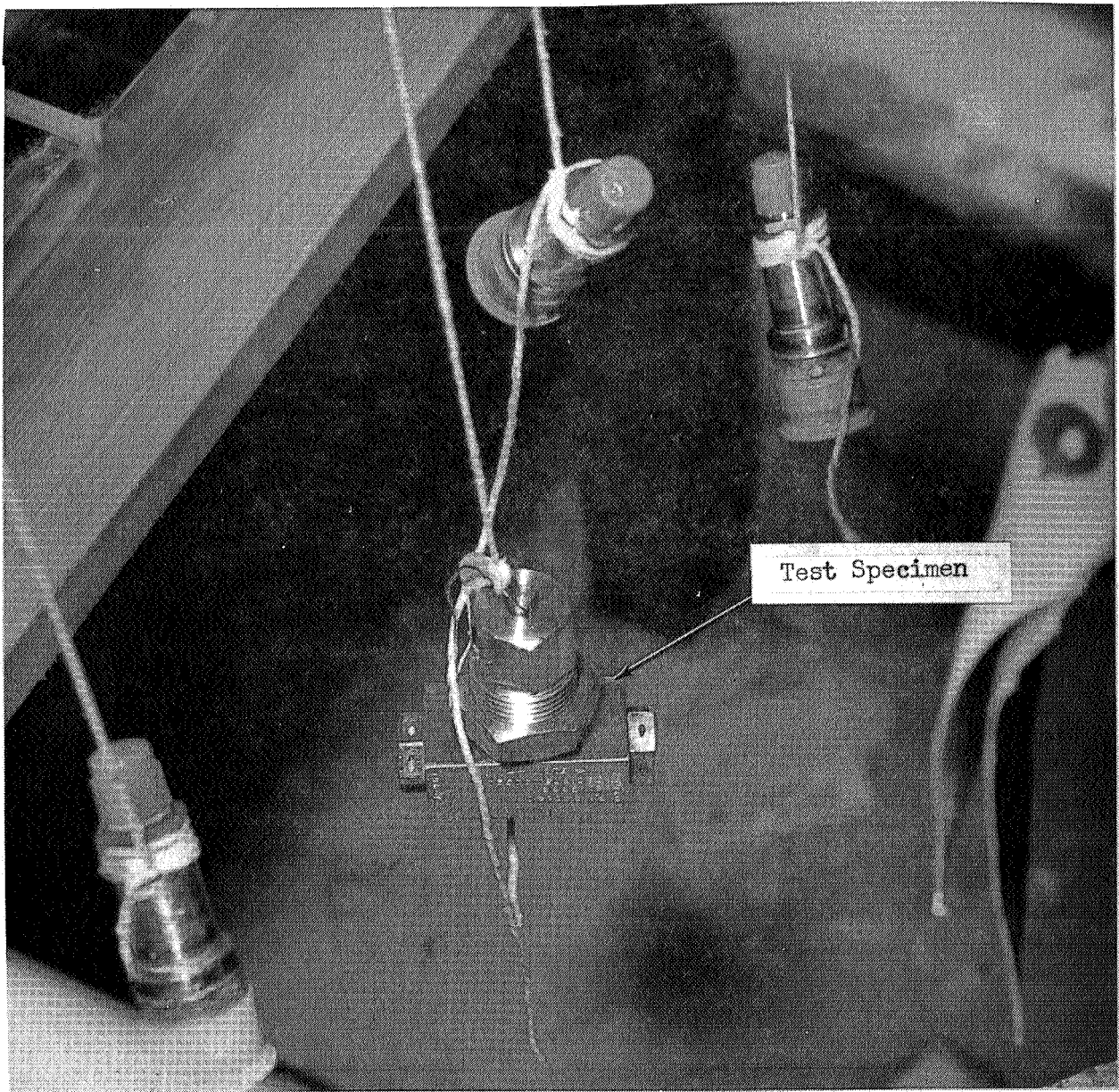
The data recorded during the salt fog test post-functional test are presented in table 8-2.

Table 8-1. Salt Fog Test Equipment List

| Item No. | Item             | Manufacturer                   | Model/<br>Part No. | Serial No. | Remarks                    |
|----------|------------------|--------------------------------|--------------------|------------|----------------------------|
| 1        | Specimen Valve   | Sage Engineering and Valve Co. | 2-9064-0           | 3668       | 1/4-inch calibration valve |
| 2        | Salt Fog Chamber | CCSD Chemical Lab.             | NA                 | NA         | As per KSCSTD-164(D)       |

Table 8-2. Functional Test Data Obtained After Salt Fog Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |



**Figure 8-1. Salt Fog Test Setup**

## SECTION IX

### CYCLE TEST

#### 9.1 TEST REQUIREMENTS

- 9.1.1 The specimen valve and probe shall be subjected to 1000 cycles.
- 9.1.2 Each cycle shall consist of inserting and removing the specimen probe while the specimen valve inlet is pressurized with helium to 6000 psig.
- 9.1.3 The specimen valve and probe shall be checked for leakage during the cycle test.
- 9.1.4 The specimen valve and probe shall be subjected to a functional test, as specified in section IV, following 50, 100, 500 and 1000 cycles of the cycle test.

#### 9.2 TEST PROCEDURE

- 9.2.1 The specimen valve and probe were installed in the test setup as shown in figures 9-1 and 9-2 using the equipment listed in table 9-1. The specimen valve and probe were submerged in water bath 13. All hand valves were closed.
- 9.2.2 The inlet of hand valve 4 was pressurized to 6000 psig from helium pressure source 2. Hand valve 4 was opened. Regulator 7 was adjusted and the inlet of the specimen valve was pressurized to 6000 psig. The specimen inlet pressure was monitored on gage 8.
- 9.2.3 The specimen probe was inserted and removed from the specimen valve probe port. This constituted one cycle. One thousand cycles were performed on the specimen valve.
- 9.2.4 The specimen probe pressure was monitored on gage 11 and the specimen valve outlet pressure was monitored on gage 10.
- 9.2.5 The specimen valve and probe were monitored for external leakage during the cycle test by observing water bath 13 for bubbles.
- 9.2.6 A functional test as specified in section IV was performed at the completion of 50, 100, 500, and 1000 cycles of the cycle test.

#### 9.3 TEST RESULTS

- 9.3.1 The specimen valve and probe were subjected to 1000 cycles. A cycle consisted of inserting and removing the probe from the specimen valve while the specimen valve inlet was pressurized at 6000 psig. No evidence of leakage was observed during the cycle test.

9.3.2 The specimen valve developed an internal leak on removing the probe after 250 cycles. The specimen valve was disassembled and the body seal (P/N 12A) was found to have deteriorated. A new seal was installed and testing continued.

9.3.3 The specimen valve and probe were successfully subjected to functional tests after 50, 100, 250, 500 and 1000 cycles of the cycle test.

9.11 TEST DATA

9.4.1 The data recorded during the cycle test are presented in tables 9-2 through 9-5.

9.4.2 The body seal deterioration is shown in figure 9-3.

Table G-1. Cycle Test Equipment List

| Item No. | Item               | Manufacturer                   | Model/<br>Part No. | Serial No. | Remarks   |
|----------|--------------------|--------------------------------|--------------------|------------|---|
| 1        | Test Specimen      | Sage Engineering and Valve Co. | 2-9064A            | 3668       | 1/4-inch calibration valve                      |
| 2        | Helium Source      | CCSD                           | NA                 | NA         | 6000-psig                                       |
| 3        | Pressure Gage      | Ashcroft                       | NA                 | 95-1508-B  | 0-to 10,000-psig<br>±1.0% FS<br>Cal date 1-7-67 |
| 4        | Hand Valve         | Aminco                         | 13126              | NA         | 1/4-inch  |
| 5        | Filter             | Fluid Dynamics                 | FL-20-8-BB         | NA         | 2-micron  |
| 6        | Pressure Gage      | Ashcroft                       | NA                 | 00613-1    | 0-to 10,000-psig<br>±1.0% FS<br>Cal date 1-7-67 |
| 7        | Pressure Regulator | Tescom Corp.                   | 26-1021-20         | 3024       | 0-to 10,000-psig<br>±1.0% FS<br>Cal date 1-9-67 |
| 8        | Hand Valve         | Aminco                         | 13126              | NA         |   |
| 9        | Pressure Gage      | Heise                          | H 49480            | 5-1653-B   | 0-to 10,000-psig<br>±1.0% FS<br>Cal date 2-1-67 |
| 10       | Pressure Gage      | Heise                          | H 49479            | 5-1652-B   | 0-to 10,000-psig<br>±1.0% FS<br>Cal date 2-1-67 |
| 11       | Specimen Probe     | Sage Engineering and Valve Co. | 2-9074B            | 3850       |   |
| 12       | Water Bath         | CCSD                           | NA                 | NA         |   |



Table 9-2. Functional Test Data Obtained After 50 Cycles of the Cycle Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

Table 9-3. Functional Test Data Obtained After 100 Cycles of the Cycle Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

Table 9-4. Functional Test Data Obtained After 250 Cycle Failure Repair

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

Table 9-5. Functional Test Data Obtained After 500 Cycles of the Cycle Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

Table 9-6. Functional Test Data Obtained After Cycle Test

| Specimen Valve               |       |        |          |          |
|------------------------------|-------|--------|----------|----------|
| Pressure (psig)              |       |        | Leakage  |          |
| Inlet                        | Probe | Outlet | Internal | External |
| 2000                         | 0     | 2000   | None     | None     |
| 4000                         | 0     | 4000   | None     | None     |
| 6000                         | 0     | 6000   | None     | None     |
| With Specimen Probe Inserted |       |        |          |          |
| 6000                         | 2000  | 2000   | None     | None     |
| 6000                         | 4000  | 4000   | None     | None     |
| 6000                         | 6000  | 6000   | None     | None     |
| Tube in water                | 6000  | 6000   | None     | None     |

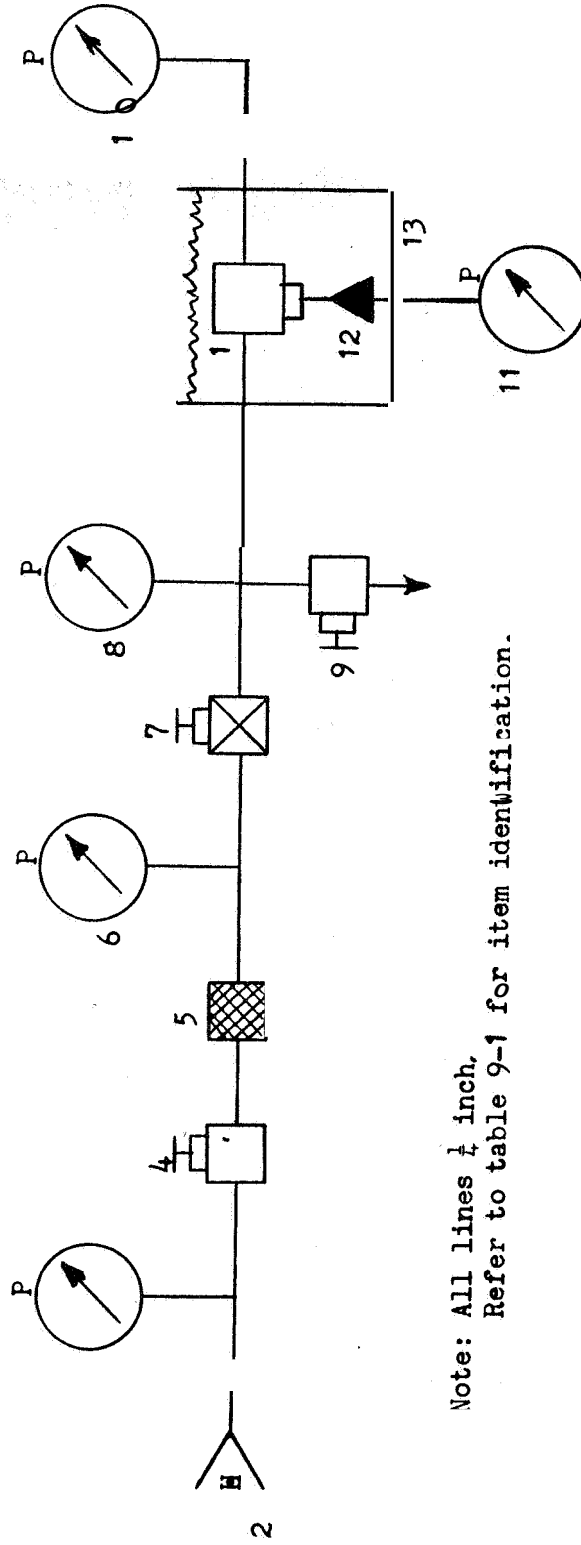


Figure 9-1. Cyc4 Test Schematic

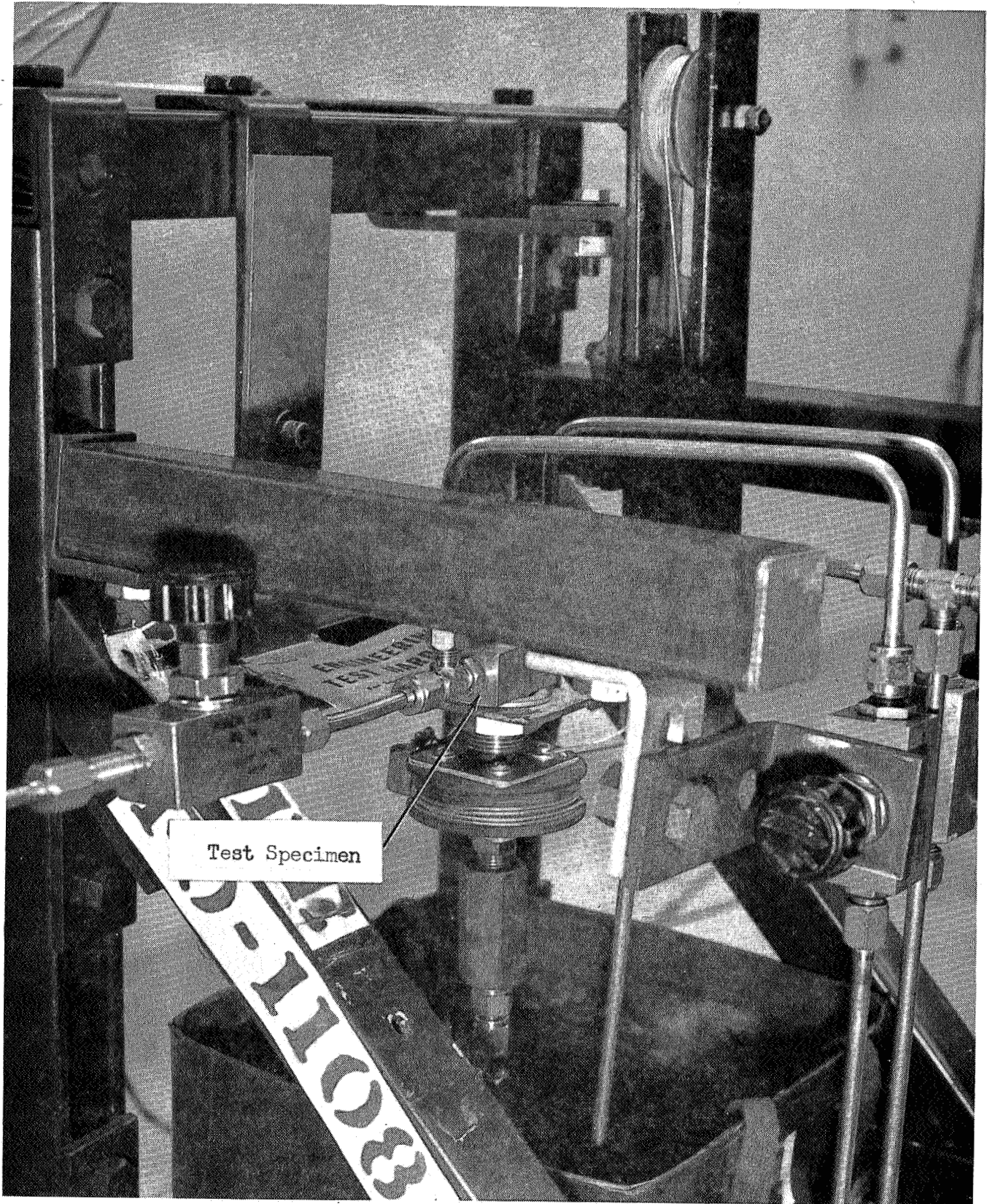
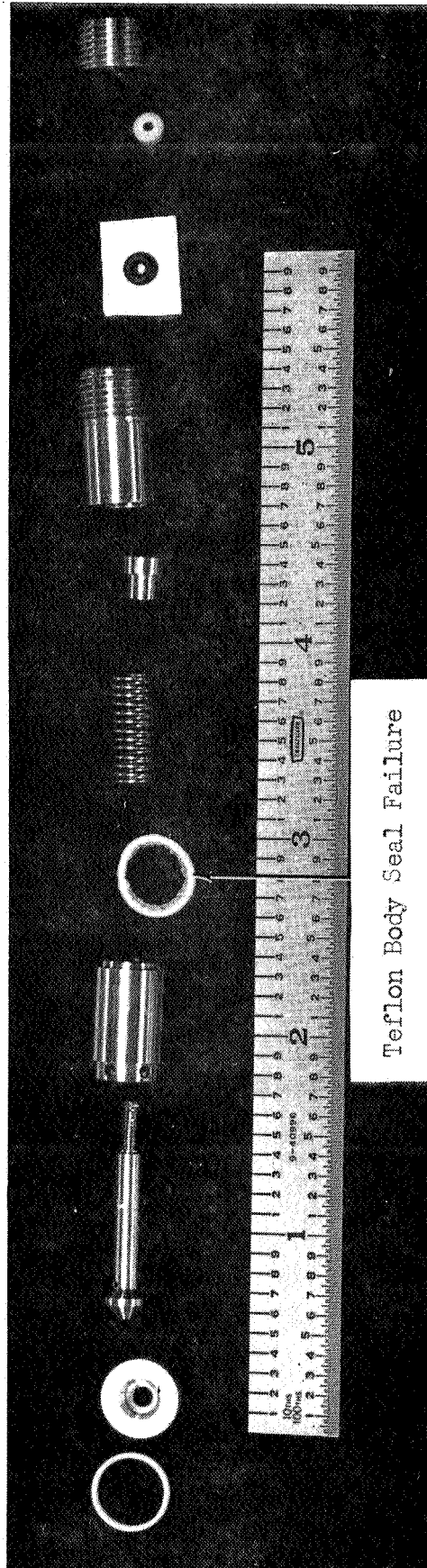


Figure 9-2, Cycle Test Setup



**Figure 9-3. Cycle Test Failure**

## SECTION X

### BURST TEST

#### 10.1 TEST REQUIREMENT

- 10.1.1 The specimen valve and probe shall be subjected to a pressure of 24,000 psig for 15 minutes.
- 10.1.2 The specimen valve and probe shall be inspected for damage following this 15 minute period.

#### 10.2 TEST PROCEDURE

- 10.2.1 The specimen valve and probe were installed in the test setup as shown in figures 10-1 and 10-3 using the equipment listed in table 10-1. All hand valves were closed. The specimen probe was not installed.
- 10.2.2 Hand valve 4 was opened and pump 3 was operated and the inlet of the specimen valve was pressurized to 24,000 psig. The pressure was monitored on gage 5.
- 10.2.3 Hand valve 4 was closed. The specimen valve was checked for leakage for 15 minutes by monitoring gage 5 for a drop in pressure.
- 10.2.4 The specimen valve pressure was recorded at the beginning and at the end of the 15 minute period.
- 10.2.5 At the completion of the 15 minute pressurization period, hand valve 6 was opened and the specimen valve inlet pressure was vented to zero psig. The specimen was removed and installed in the test setup as shown in figure 10-2 using the equipment listed in table 10-1. The specimen probe was inserted and all hand valves were closed.
- 10.2.6 Hand valve 4 was opened, pump 3 was operated, and the specimen valve was pressurized through the specimen probe to 24,000 psig. The pressure was monitored on gage 5.
- 10.2.7 Hand valve 4 was closed. The specimen probe was checked for leakage for 15 minutes by monitoring gage 5 for a drop in pressure.
- 10.2.8 The specimen probe pressure was recorded at the beginning and at the end of the 15 minute period.
- 10.2.9 At the completion of the 15 minute pressurization period, hand valve 6 was opened and the specimen probe pressure was vented to zero psig.
- 10.2.10 The specimen valve and probe were inspected for damage and distortion. All data were recorded.

10.3            TEST RESULTS

10.3.1            The specimen valve with the probe ~~removed~~ was successfully subjected to 24,000 psig for 15 minutes with no observable leakage ■

10.3.2            The specimen valve with the probe inserted was successfully subjected, ~~at~~ the ~~probe~~ inlet, to 24,000 psig for 15 minutes with no observable **leakage**.

10.3.3            The specimen valve and probe were visually inspected after each of the 15 minutes pressurization periods. No evidence of damage or distortion was observed.

10.4            TEST DATA

Test data recorded during the test are presented in table 10-2.



Table 10-1. Burst Test Equipment List

| Item No. | Item           | Manufacturer                   | Model/<br>Part No. | Serial No. | Remarks   |
|----------|----------------|--------------------------------|--------------------|------------|---|
| 1        | Test Specimen  | Sage Engineering and Valve Co. | 2-9064C            | 3668       | 1/4-inch Calibration valve                            |
| 2        | Reservoir      | CCSD                           | NA                 | NA         | Deionized water                                       |
| 3        | Pump           | Sprague Eng. Corp.             | NA                 | 300-16-64  | 50,000-psi g  |
| 4        | Hand Valve     | Aminco                         | 50011-A            | NA         | 1/4-inch  |
| 5        | Pressure Gage  | Astra                          | NA                 | D11893-A   | 0-to 100,000-<br>psig<br>±0.5% FS<br>Cal date 1-28-67 |
| 6        | Hand Valve     | Aminco                         | 50011-A            | NA         | 1/4-inch  |
| 7        | Specimen Probe | Sage Engineering and Valve Co. | 2-9074B            | 3850       |   |
| 8        | Burst Chamber  | CCSD                           | NA                 | 201344     | 3 ft by 3 ft by 3 ft                                  |
| 9        | Pressure Cap   | Aminco                         | NA                 | NA         | 1/4-inch  |

Table 10-2. Burst Test Data

|  |                          |
|--|--------------------------|
| Valve inlet 24,000 psig for 15 minutes | No leakage or distortion |
| Probe inlet 24,000 psig for 15 minutes | No leakage or distortion |

Note: All lines  $\frac{1}{4}$  inch  
 Refer to table 10-1 for item identification.

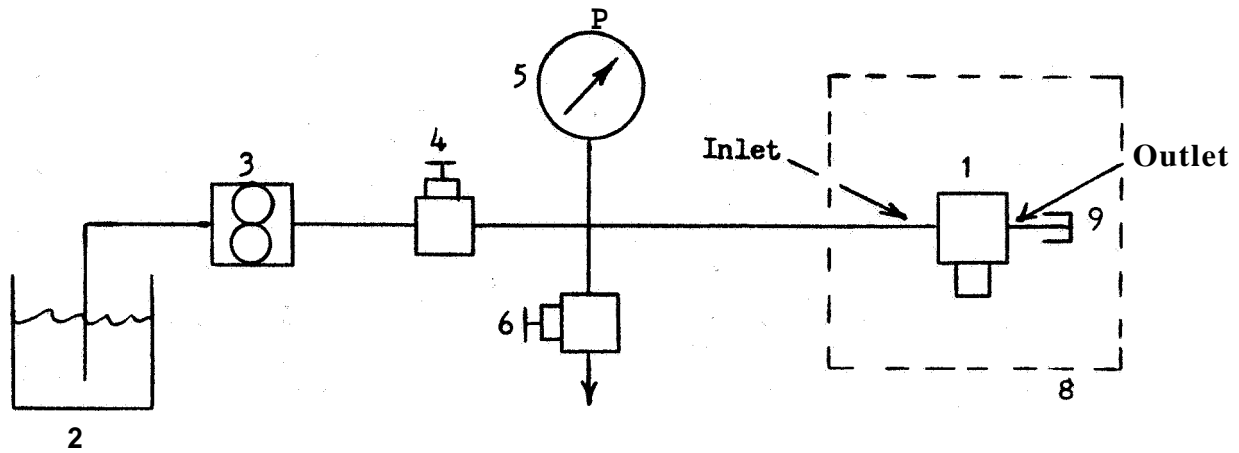


Figure 10-1. Burst Test Schematic

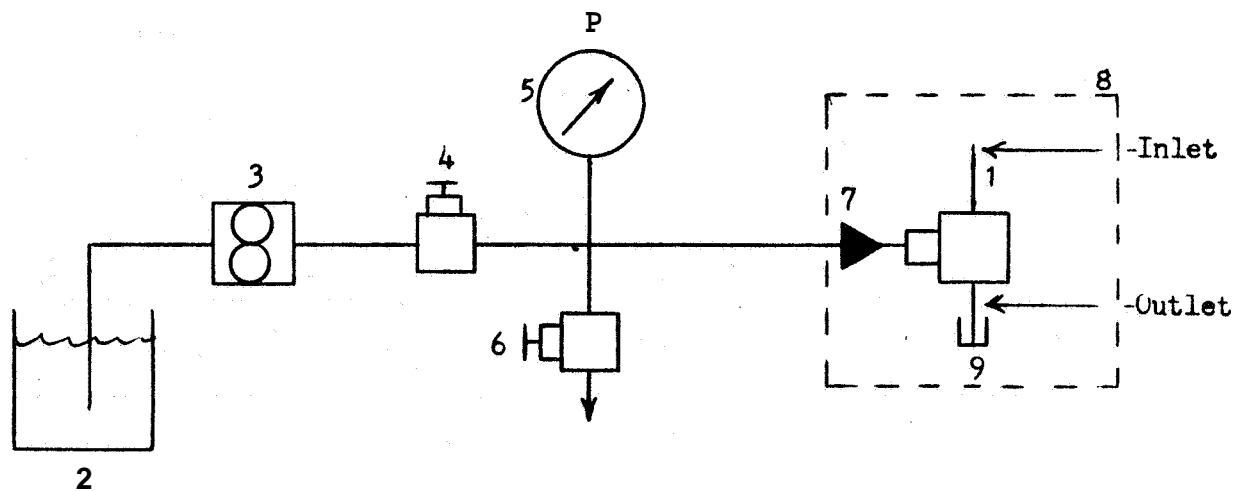


Figure 10-2. Burst Test Schematic

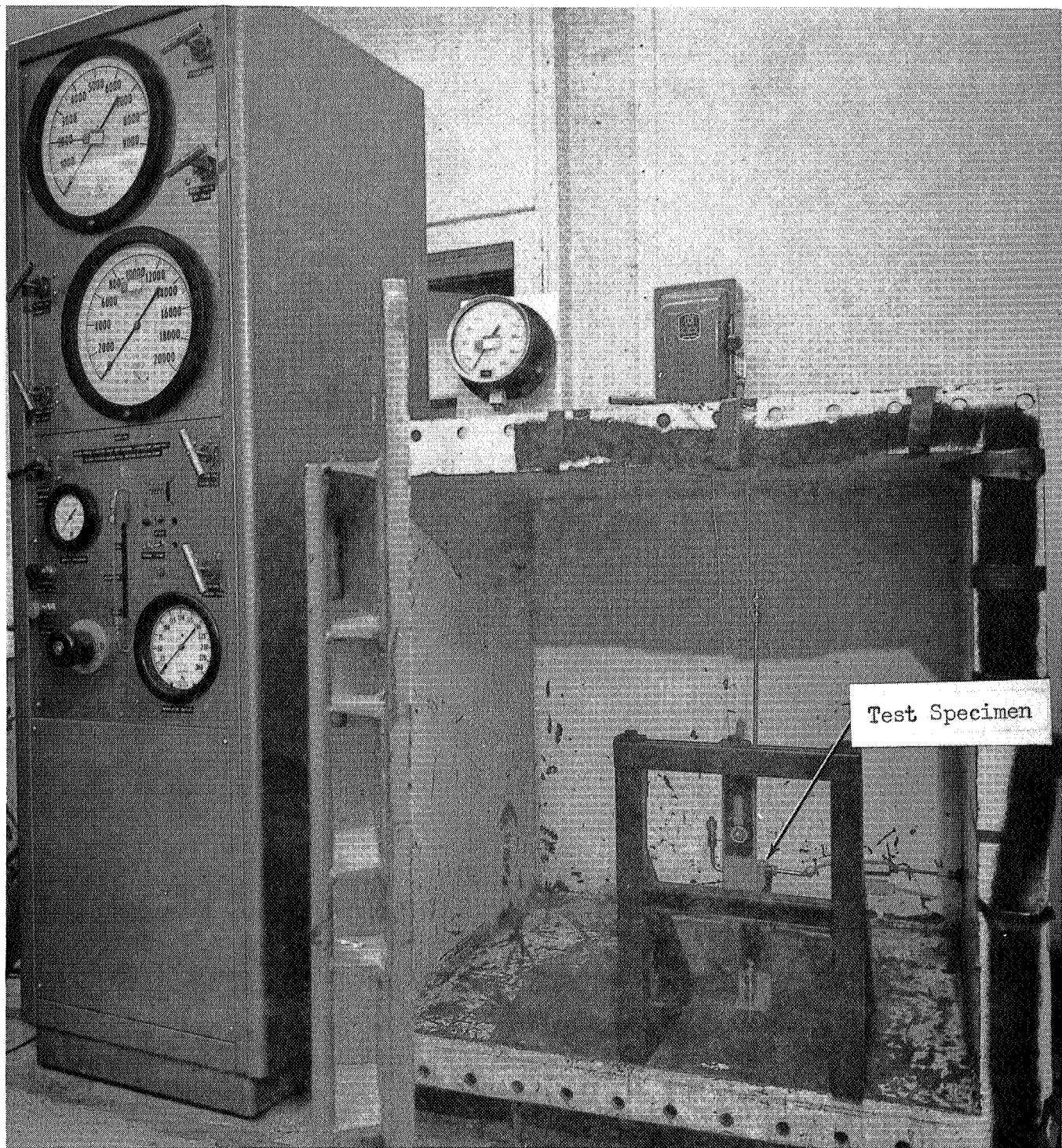


Figure 10-3. Burst Test Setup

APPROVAL

TEST REPORT

FOR

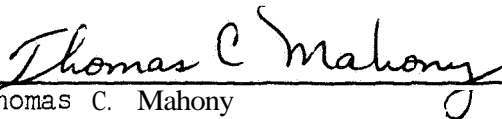
CALIBRATION VALVE, 1/4-INCH, 6000-PSIG

Sage Engineering and Valve Co. Drawing Number 2-9064-C

With Probe Drawing Number 2-9074B

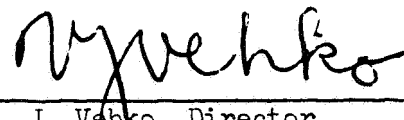
NASA Drawing Number 75M09618 PCVA-1

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